A. T. MEYER AND ASSOCIATES, INC.

ENVIRONMENTAL, NOISE, AND OCCUPATIONAL HEALTH CONSULTANTS

DOE/ET/13650-1



# QUARTERLY REPORT ON THE SAFETY ANALYSIS AND REVIEW SYSTEM FOR THE DEPARTMENT OF ENERGY'S FOSSIL ENERGY PROGRAMS PHASE I

December 1980

DE-AC01-80ET13650.002



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## DISCLAIMER

# QUARTERLY REPORT ON THE SAFETY ANALYSIS AND REVIEW SYSTEM FOR THE DEPARTMENT OF ENERGY'S FOSSIL ENERGY PROGRAMS PHASE I

by

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December 1980



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Under

DOE Contract DE-AC01-80ET13650.002

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## ABSTRACT

The DOE Safety Analysis and Review System (SARS), established by DOE Order 5481.1, is designed to ensure that DOE operations are subjected to a systematic life cycle evaluation of the safety risks to people, property, and the environment, both on and off site. Central to the SARS concept is the requirement that safety analyses conducted by the responsible operating or design entity be subjected to an independent review process. This review results in a written authorization by the designated DOE official for the operation to proceed.

The purpose of this quarterly report is to summarize work performed to date by A. F. Meyer and Associates, Inc. (AFMA) under DOE Contract DE-AC01-80ET13650.002 in support of SARS implementation. Under this contract, AFMA is providing technical assistance to DOE to: analyze SARS data and develop recommended milestones for the Headquarters review requirements; analyze and recommend alternative procedures for conduct of such reviews and develop costs thereon; and support such Headquarters reviews and evaluate SARS activities at project and field analysis and review levels.

The deliverables which originally had been scheduled for completion by this date have been delayed due to a DOE delay in providing necessary information to AFMA. Delivery of the SARS Review Plan Schedule, the Alternative SARS Review Plan, and the SARS Documentation Report has been rescheduled to later dates. The following sections of this quarterly report discuss the status of research and preliminary findings of these studies.

## SARS REVIEW PLAN SCHEDULE

AFMA is currently investigating the available data and developing a methodology for the determination of the ASFE SARS review schedule. AFMA will apply this methodology to determine accurate project schedules and target dates for completion of requisite safety analysis documents. The necessary review time then will be estimated for each project based on the hazard class and other details of the projects. This last step in the process cannot be accomplished until certain policy decisions which affect the review schedules have been reached by higher authorities in OPTA and ASFE. However, AFMA will continue to attempt to develop tentative schedules in the absence of this information.

For projects with future start-up dates, the Fossil Energy Program Summary Document will be used to estimate dates of completion of PSARs and FSARs unless official projected dates become available. Where backfits are required for projects already in progress, an attempt will be made to ascertain the projected completion dates through direct contact with project personnel.

## ALTERNATIVE SARS REVIEW PLAN

DOE Order 5481.1 requires the SARS review to include a documented evaluation of the adequacy of the preventive or mitigative design features. Review of the administrative controls provided to limit the probability of an adverse occurrence or the severity of the hazard is also required. In addition, the review provided by the line program organization must be conducted primarily by individuals not involved in the DOE operation being evaluated. No clear designation is made of the organizational entity to have review authority for each class of project. However, it is stated in the Order that the review may be conducted at the field or Headquarters level.

In this study, AFMA is investigating alternative means of providing the requisite safety reviews. Several factors, including the level of risk and the nature of each particular project, will affect the type and scope of the safety analysis and the associated technical and professional expertise necessary for evaluation. AFMA has begun an examination of the risk level of the various ASFE projects. Additionally, investigation of a series of alternatives depending upon each project's complexity has been started. Those alternatives which are felt to deserve further analysis are discussed in the following paragraphs, along with some of their respective pros and cons. Thus far, AFMA has begun investigating the relative merits of the following entities performing the reviews:

- DOE Headquarters
- DOE Operations Offices
- DOE Energy Technology Centers
- Contractors/Consultants

The review process could be focused at DOE Headquarters for all projects. However, considering the number of operations requiring safety analyses and, thus, reviews, this would impose a major workload upon ASFE. Normally, a separate review panel would be required for each project except where there was similarity of projects' hazards

and scope of safety analysis requirement. Typically, each panel would require a qualified safety specialist, an independent authority on safety not under the direct contract of DOE, and a member from another project under FE cognizance, but not in the same administrative management scheme as the project under review. Other group members should have technical or safety qualifications related to the unique characteristics of the involved project or facility.

A short and simple safety analysis document, such as for a low risk project, may be the subject of a single formal meeting of a review panel. A complex safety analysis is often developed in phases and should also be reviewed in phases. This would entail a major commitment of time and personnel resources for the formal review meetings and for fulfilling documentation requirements. In addition, site visits are often required for an adequate understanding of the safety analysis, especially in the case of high risk projects.

In light of these requirements, it is clear that a substantial number of additional environmental, health, and safety personnel would have to be hired by DOE in order for Headquarters to assume the entire review responsibility using DOE HQ employees. The HQ review panel could, as one option, be comprised of safety and health experts from the Operations Offices and the ETCs. Constraints on this include the lack of available qualified field personnel and/or lack of available funds. On the other hand, HQ could hire a permanent consultant to coordinate review panels, ensure the provision of independent reviews, and maintain the documentation file. The major weakness of these options is that persons having no knowledge of the specific site and operation described in the safety analysis would often be charged with reviewing the adequacy of the document. This could result in either a deficient review or one which is extremely inefficient, time consuming, and costly because the participants would be starting out so low on the learning curve.

The imposition of such a heavy workload upon ASFE could result in costly delays of operations, safety reviews, and resultant authorizations. It also would not foster DOE's overall managerial approach toward decentralization. However, DOE Headquarters is responsible for policy and program development, and, accordingly, should be

responsible for major decisions affecting higher risk operations. The bulk of ASFE operations are considered moderate risks; there is a small number of high risk projects. Thus, for HQ to assume review authority for only high risk projects would avoid many of the problems cited above. In addition, the difficulties associated with project unfamiliarity could be partially avoided if preliminary reviews were provided to the HQ review panel by the entity with direct project management authority.

As another option, the DOE Operations Offices could be delegated responsibility for safety reviews for low and moderate risk operations. In this case they could either review their own operations or those of other Operations Offices. The latter alternative could pose a problem in regard to control and coordination, and some central authority (either DOE employees or a contractor) likely would be required to oversee the process.

Delegating the responsibility to the Operations Offices would serve DOE's aim of decentralization to the field. However, it is not clear whether these offices have sufficient resources to conduct the reviews in their present state. For instance, in a recent report, GAO found deficiencies attributed to the lack of adequate staffing in the Oak Ridge Operations Office's Safety and Environmental Control Division (SECD). It was found that SECD had five safety professional vacancies in January, 1980, with two of them remaining vacant due to the fact that they were recommended for downgrading under the civil service system. In another study, it was found that only two of the eight Operations Offices have safety staffs which are discrete organizational units with the Safety Director having direct access to the Field Office Manager. This factor could make it extrememly difficult to coordinate and organize the safety review panels and manage the reviews in an effective manner. In addition, the professional staffing level has either decreased or remained the same at five Operations Offices since the AEC era. Without an increase in qualified environmental, health, and safety personnel, it would be impossible for the Operations Offices to handle the workload imposed on them if they were required to handle the reviews for all low and moderate risk operations.

As another alternative, the Energy Technology Centers could have authority for safety reviews for moderate and/or low risk projects under their cognizance. They could also provide an initial review for high risk projects. The major benefit of this alternative is the ease of communication between the contractor operating the facility and the ETC Safety and Health Manager. There could be a problem ensuring the independence of the review because of this, but this may be avoided if the Safety and Health Managers report directly to the ETC Directors. However, the ETC Safety and Health Manager may be so intimately involved with putting together the SARS documents that it will be impossible for this individual to be totally objective. As with the Operations Offices, sufficient personnel resources may not be available to adequately review all safety analyses, and the skills available may be inappropriate to the task. In these cases, consultants could be hired to act as the review body but this may be a costly alternative.

As specified previously, contractors could be utilized to coordinate review panels, ensure the provision of independent reviews, and maintain the documentation files. They also could be employed to perform the actual reviews. The major weakness with this latter option is that the skills required generally would be available only in energy-producing industries. In these cases, there could be difficulties in utilizing such contractors because of possible conflicts of interests and the use of proprietary information which is often involved.

Future research which still needs to be completed on this project entails further definition of the alternatives in terms of the skills needed for the reviews and those available from the sources outlined above. In addition, the relative costs of the alternative review schemes will be estimated to the extent possible.

## SARS DOCUMENTATION REPORT

DOE Order 5481.1 requires that all pertinent details of the analysis, review, and authorization relative to any DOE operation be traceable from the initial identification of a hazard to its elimination or the application of controls necessary to appropriately reduce the risk. Each ASFE operation is characterized by unique hazard risks. The content of each Safety Analysis Report is intended to provide sufficient background materials to understand the unique characteristics of the project, identify the problem, evaluate alternative solutions, and make recommendations. Thus, there is little difference in format between a Preliminary Hazards Analysis Report and an Operational Hazards Analysis Report, for example, but they will vary considerably in scope and may differ in approach. A PHA would identify hazards and recommend solutions to control, eliminate, or mitigate the hazard, whereas an OHA would concentrate on the adequacy of implementation.

Documentation should be retained for the life of the involved DOE operation and should include information pertaining to:

- the systematic identification of hazards;
- the estimation of the likelihood of occurrence of each hazard-related incident;
- the estimation of potential consequences;
- the identification of measures to eliminate, control, or mitigate hazards;
- achievement of compliance with all safety design specifications;
- the review and approval processes of SARS;
- documented management acceptance of any residual risk associated with the operation; and
- identification of the funding level necessary to achieve the safety level objective.

AFMA is comparing the SARS documentation requirements with procedures used elsewhere to develop an approach which meets SARS requirements in a cost effective manner.

SARS ASSESSMENT REPORT

AFMA is undertaking an intensive examination of the SARS-related events pertinent to specific DOE operations such as the ICGG and CONOCO gasification projects. Currently, there appears to be an overall lack of communication and coordination between those performing the safety analyses and those expected to perform the independent reviews. For instance, the PSAR for the ICGG high-BTU gasification project is expected by the Corps of Engineers/Huntsville Division to be available for independent review by July 1981. Although OPTA is expected to provide the review, and, therefore should already be developing the review panel and procedures to be followed, OPTA was not aware that a PSAR was in preparation. It seems clear that some mechanism is needed to provide an overview of the ASFE SARS process. A central authority is needed to monitor the SARS process and ensure that the review entities are appropriately notified. The kinds of information needed would include:

- when safety analyses are to be initiated;
- the preparer of the SAR;
- projected date of SAR completion;
- independent reviewers; and
- project decision points.

This type of control process would allow for more accurate recordkeeping, more efficient preparation and review of safety analyses, and would feed naturally into the documentation requirements of DOE Order 5481.1.

Through interviews at various field operations, it has become apparent that another problem area in relation to SARS implementation is the lack of clear direction from DOE Headquarters. No official guidance has been provided to the field in regard to SARS implementation, and Headquarters remains responsible for the review and authorization of all DOE projects and their related safety analyses. This

imposes a very heavy workload on ASFE, and it would seem that a more thorough and efficient review of at least the low and moderate risk operations could be carried out in the field. For high risk operations as well, a preliminary review could be carried out at the field level and the review comments and recommendations could be forwarded to Headquarters for consideration and/or inclusion in the formal review. Regardless of what is finally decided upon, it is clear that firmer direction and control from Headquarters is necessary in regard to issues such as the performance of reviews and the recommended content of safety analyses.